

Various methods of computing the time for planting among the races of Borneo.

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Agriculture, even if rude, is at once a token and a cause of primitive culture. The native of Borneo has no special reason to pay attention to the phenomena among which he lives, unless he is a farmer. He may, like the Punan, know the lie of the land for miles around, and be able to judge the slightest indications of the jungle, but that is hardly knowledge which leads to civilization. The farmer, on the other hand, has to study the course of the seasons, the nature of the soil and the variability of animals and plants.

There are certain special problems which have presented themselves to the uncultured farmer in Borneo, which would not cause the least difficulty to an European in a temperate climate. In the tropics as everywhere else, agriculture is performed with the yearly regularity which is so familiar that to us it seems in no way remarkable. Near the equator, of course, seasons have not as a rule the same striking character that they have in higher latitudes. In Borneo from October to April the wind is usually from the north-east, and brings rain, more to some districts than to others, while during the rest of the year the monsoon is reversed, but there is little else to distinguish one month's weather from another. It is almost impossible to tell the time of year from temperature or moisture, and quite impossible to do so with any accuracy.

The farmers have found, nevertheless, that certain seasons are more favourable than others to their operations. It is not so much the crop which requires to be sown and reaped at particular times, as the ground, whose preparation is difficult in

wet weather. Rice will grow and ripen in a sufficiently warm, sunny climate provided there is enough water on the land, either from irrigation or continual showers.

In Borneo there is usually rain all round the year in magnificent quantity. It is not according to the rainiest season, but according to the driest that the farmer regulates his work. For the jungle is felled and left to dry before being burnt, and the success of the crop depends largely on the completeness of the clearing. The best crop will be generally obtained on land burnt off at the driest season.

How are these illiterate tribes to find out when a particular season has arrived? In England this is simple enough; we have almanacks galore, we have clocks which can tell us the length of time from sunrise to sunset. The native does not know how many days there are in a year, and would not take the trouble to keep count if he did. He may know how many moons there are, but like the Malays he would probably get about eleven days wrong every year, and eleven days is a large error of itself. In two or three years the crops would be planted far too early. Unfortunately, too, the length of the day varies very little in the tropics, and the native has no means of observing that variation. He is therefore obliged to have recourse to the stars or the sun to tell the time of year.

The Dayaks and many of the less important tribes look to the stars to guide them. Every day, as they know, these bodies rise a little earlier, and some wise man is appointed to go out before dawn to watch for the Pleiades. Dayaks use the Malay expressions "*bintang tiga*" for Orion's belt, and "*bintang banyak*" or *Apai andau* (the father of the day) for the Pleiades. When the "seven stars" rise while it is yet dark, it is time to begin.

Two of the house are sent into the jungle to find omens, while the others wait. In two days perhaps, or a fortnight, or at most a month, the favourable indications will appear, and then an end is made both of science and superstition and the Dayaks set to work on the forest. If they are so late that Orion's belt rises before daybreak, they must make every effort to regain lost time or the crop will be poor. What kind of land they will choose depends on circumstances: in any case it will have lain two or three years fallow and will be thickly covered with vegetation.

The virgin forest, though less easy to fell, has this advantage over previously cleared ground, that no grass is growing on the land and much trouble in weeding is avoided. But the men do the felling, the women most of the weeding, and whether a choice is made of forest or scrub will depend largely on the courtesy and consideration shown by the men for their wives and daughters. If the forest is chosen, the men, sometimes helped by their womenfolk, cut down the undergrowth and small trees with their parangs, and then begin to attack the great trunks from slight platforms well above the ground, which enable them to avoid buttresses and roots. The felling is usually accomplished in this manner. The ground being as a rule the sloping side of a hill, each tree is cut through from one side nearly to the core, and on the opposite side an equal distance a little lower down the trunk. The lower cut is made on the side facing down hill. By dint of much labour, in which the various members of a village generally come to help their comrades, a whole hill side of trees is cut through till a slight blow will hurl them to the ground. Two heavy trunks at the summit are then felled, and made to fall on the neighbouring trees. These fall in their turn, and carry with them those below, till with a loud roar and a mighty rush of wind a V shaped space is cleared on the slope below. Like a pack of cards the forest monsters are laid low, to the intense excitement and delight of the howling spectators.

Then again the Dayaks await the permission of the stars for the next operation. Only when the Pleiades are at the zenith before dawn do they think it advisable to burn and sow. By this time, unless the weather has been wet, an unlikely circumstance at the season of year, the boughs are dry as match wood and the leaves are dead, though still on the twigs. Some hot day, towards noon, when a breeze is blowing, they take down special charms to secure wind, and also endeavour to attract the Æolian spirits by keeping up a loud whirr. The mass of dead wood is then set on fire. The flames rise to the skies and fill the country with smoke, while the added heat of the fire is almost insupportable. Insects with singed wings buzz around, and the hawks dive into the smoke to find their prey. The spectacle is grand indeed. Sometimes wet weather keeps

the wood damp until the leaves fall from the twigs, and then the land is often left untilled, for it is nearly useless. When the fire has passed over the fallen timber, deep layer of ashes and charred trunks is all that is left. The partially burnt wood is heaped round a stump and again ignited, till little save ashes, occasional stumps, and islands of green trees left to preserve valuable fruit, are to be seen in the clearing. The rice is then dropped by the women, a few grains at a time, into holes made by the men with pointed sticks; perhaps cucumber, maize and other sundry plants are sown round stumps or where the ash is especially thick; and the crop is left to the weeding of the people and the fertility of a warm, moist climate and virgin soil.

The Kenyahs and Kayans judge the seasons by the sun, and the method they adopt displays a wonderful knowledge of the precautions necessary to accuracy. The Kenyahs measure the shadow cast at midday with an instrument the Greeks would have called a gnomon. It is a pole set up near the village, guarded by a fence to keep away mischievous children and animals. In height it is more than a fathom by the span of the thumb and first finger. A piece of string weighted at each end and thrown over the top shows when it is perfectly upright. The length of the shadow is measured by a stick called "*asu do*" which is marked with notches gradually approaching one another more closely as they get further from the pole.

The interval between successive notches represents the change in the length of the shadow in three days. Midday is known to be the time when the shadow cast by the sun is at its shortest, and the Kenyahs are also aware of the fact that the direction of the shadow at noon, though sometimes to the north sometimes to the south, is always in the same straight line. The Kayan method, which differs more in practice than in theory from the Kenyah, is to let in a beam of light through a hole in the roof and measure the distance from the point immediately beneath the hole to the place where the light reaches the floor. Their measure is a plank, made level so that round discs do not roll on it, and fixed in position and direction by chocks placed at the side. This shows that they know the sun to be always due north or due south at noon.

I can only suggest one reason why these people though they have got so far, have not invented a sun-dial. That is this. In the tropics there are many days near each equinox on which no sun-dial would be of use. When the sun in its yearly course passes from the north of the zenith to the south, its shadow is due west in the morning hours, due east in the afternoon. Any time-piece depending on the direction of the shadow must therefore fail. The difficulty might indeed be obviated, but no sundial could be devised which would in the tropics tell the time in every month of the year.

This then is their instrument, in which no point essential to accuracy has been neglected. The measuring stick has been notched in accordance with the experience of previous years, and when the shadow, after lengthening during May and June, begins again to grow less, the house assembles and by mutual consent they decide when to plant. The best time for planting has not arrived until the noonday shadow is the length of the forearm from the tip of the fingers to the inside of the elbow. When the shadow is less than the length of the hand, sowing is not likely to prove very productive. The measuring stick is left in charge of some old and presumably wise man, less capable than his fellows of hard work, who sees to it that the shadow is not measured obliquely and reports the favourable moment. This man is excused from farming and is supplied with necessities in return for his services. In good years he naturally is very well treated.

It would be pleasant to stop here, and say that otherwise the Kenyahs care nothing about the heavenly bodies. But having given the bright side of the picture and shown how they have acquired some accurate knowledge, the result of long and genuine experience, it is only fair to state that they lay almost equal importance on the meaningless mummerly with which these mysterious measurements are accompanied. Such important operations could hardly fail to be overlaid with superstition.